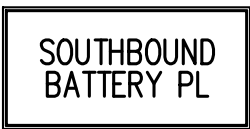


①  
W17-I100  
30"x 18"



②  
W17-I100  
30"x 18"



③  
M4-9  
30"x 24"



④  
M4-9  
30"x 24"



⑤  
M4-9  
30"x 24"



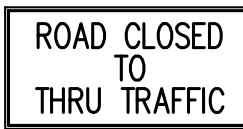
⑥  
M4-8a  
30"x 18"



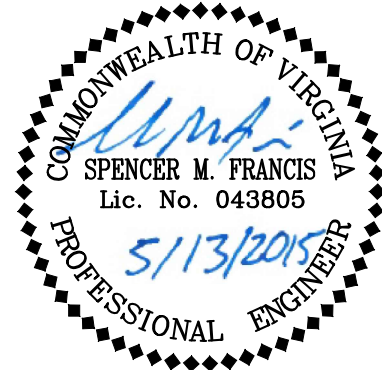
⑦  
W20-3  
48"x 48"



⑧  
W20-2  
48"x 48"



⑨  
R11-4  
60"x30"



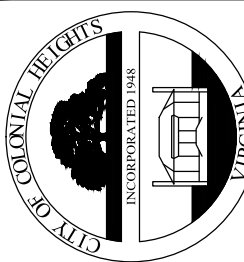
**Bowman**  
CONSULTING

Bowman Consulting Group, Ltd.

www.bowmanconsulting.com

Bowman Consulting Group, Ltd.  
3951 Westerre Parkway  
Suite 150  
Richmond, Virginia 23233  
Phone: (804) 616-3240  
Fax: (804) 270-2008

SUBMITTAL DATE	
05/13/2015	
DATE	REVISION
05/01/2015	PROGRESS SET
05/06/2015	BID SET
05/13/2015	FINAL BID SET



DRAWN
DF, JD, JF, JW, MT
DESIGNED
DF, JW, MT
CHECKED
SF, JJ
SCALE
NONE

CITY OF COLONIAL HEIGHTS  
DEPARTMENT OF PUBLIC WORKS  
ENGINEERING & DEVELOPMENT DIVISION

BRUCE AVENUE DRAINAGE IMPROVEMENTS

DETOUR PLAN

SHEET NO.

16 OF 31

MINIMUM STANDARDS FOR EROSION AND SEDIMENT CONTROL:

- MS-1: Permanent or temporary soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade but will remain dormant for longer than 14 days. Permanent stabilization shall be applied to areas that are to be left dormant for more than one year.
- MS-2: During construction of the project, soil stock piles and borrow areas shall be stabilized or protected with sediment trapping measures. The applicant is responsible for the temporary protection and permanent stabilization of all soil stockpiles on site as well as borrow areas and soil intentionally transported from the project site.
- MS-3: A permanent vegetative cover shall be established on denuded areas not otherwise permanently stabilized. Permanent vegetation shall not be considered established until a ground cover is achieved that is uniform, mature enough to survive, and that will inhibit erosion.
- MS-4: Sediment basins and traps, perimeter dikes, sediment barriers and other measures intended to trap sediment shall be constructed as a first step in any land-disturbing activity and shall be made functional before upslope land disturbance takes place.
- MS-5: Stabilization measures shall be applied to earthen structures such as dams, dikes and diversions immediately after installation.
- MS-6: Sediment traps and sediment basins shall be designed and constructed based upon the total drainage area to be served by the trap or basin.  
a. The minimum storage capacity of a sediment trap shall be 134 cubic yards per acre of drainage area and the trap shall only control drainage areas less than three acres.  
b. Surface runoff from disturbed areas that is comprised of flow from drainage areas greater than or equal to three acres shall be controlled by a sediment basin. The minimum storage capacity of a sediment basin shall be 134 cubic yards per acre of drainage area. The outfall system shall, at a minimum, maintain the structural integrity of the basin during a 25-year storm of 24-hour duration. Runoff coefficients used in runoff calculations shall correspond to a bare earth condition or those conditions expected to exist while the sediment basin is utilized.
- MS-7: Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion. Slopes that are found to be eroding excessively within one year of permanent stabilization shall be provided with additional slope stabilizing measures until the problem is corrected.
- MS-8: Concentrated runoff shall not flow down cut or fill slopes unless contained within an adequate temporary or permanent channel, flume or slope drain structure.
- MS-9: Whenever water seeps from a slope face, adequate drainage or other protection shall be provided.
- MS-10: All storm sewer inlets that are made operable during construction shall be protected so that sediment-laden water cannot enter the conveyance system without first being filtered or otherwise treated to remove sediment.
- MS-11: Before newly constructed stormwater conveyance channels or pipes are made operational, adequate outlet protection and any required temporary or permanent channel lining shall be installed in both the conveyance channel and receiving channel.
- MS-12: When work in a live watercourse is performed, precautions shall be taken to minimize encroachment, control sediment transport and stabilize the work area to the greatest extent possible during construction. Nonerodible material shall be used for the construction of causeways and cofferdams. Earthen fill may be used for these structures if armored by nonerodible cover materials.
- MS-13: When a live watercourse must be crossed by construction vehicles more than twice in any six-month period, a temporary vehicular stream crossing constructed of nonerodible material shall be provided.
- MS-14: All applicable federal, state and local regulations pertaining to working in or crossing live watercourses shall be met.
- MS-15: The bed and banks of a watercourse shall be stabilized immediately after work in the watercourse is completed.
- MS-16: Underground utility lines shall be installed in accordance with the following standards in addition to other applicable criteria:  
a. No more than 500 linear feet of trench may be opened at one time.  
b. Excavated material shall be placed on the uphill side of trenches  
c. Effluent from dewatering operations shall be filtered or passed through an approved sediment trapping device, or both, and discharged in a manner that does not adversely affect flowing streams or off-site property.  
d. Material used for backfilling trenches shall be properly compacted in order to minimize erosion and promote stabilization.  
e. Restabilization shall be accomplished in accordance with these regulations.  
f. Applicable safety regulations shall be complied with.
- MS-17: Where construction vehicle access routes intersect paved or public roads, provisions shall be made to minimize the transport of sediment by vehicular tracking onto the paved surface. Where sediment is transported onto a paved or public road surface, the road surface shall be cleaned thoroughly at the end of each day. Sediment shall be removed from the roads by shoveling or sweeping and transported to a sediment control disposal area. Street washing shall be allowed only after sediment is removed in this manner. This provision shall apply to individual development lots as well as to larger land-disturbing activities.
- MS-18: All temporary erosion and sediment control measures shall be removed within 30 days after final site stabilization or after the temporary measures are no longer needed, unless otherwise authorized by the local program authority. Trapped sediment and the disturbed soil areas resulting from the disposition of temporary measures shall be permanently stabilized to prevent further erosion and sedimentation.
- MS-19: Properties and waterways downstream from development sites shall be protected from sediment deposition, erosion and damage due to increases in volume, velocity and peak flow rate of stormwater runoff for the stated frequency storm of 24-hour duration in accordance with the following standards and criteria. Stream restoration and relocation projects that incorporate natural channel design concepts are not man-made channels and shall be exempt from any flow rate capacity and velocity requirements for natural or man-made channels\*\*

\*\*MS-6 and MS-19 deal with design aspects of the plan. For further information, please consult the latest edition of the Virginia Erosion and Sediment Control Handbook. Also refer to the sediment basin/trap design tables and the adequate outfall table on the Erosion and Sediment Control Detail Sheet.

GENERAL EROSION AND SEDIMENT CONTROL NOTES:

1. Erosion and sediment control (ESC) devices must be installed and maintained in accordance with the latest version of the Virginia Erosion and Sediment Control Handbook and the Virginia Erosion and Sediment Control Regulations.
2. All vegetative and structural erosion and sediment control practices will be constructed and maintained according to minimum standards and specifications of the Virginia Erosion and Sediment Control Handbook and Virginia Regulation VR 625.02.00.
3. All erosion and sediment control (ESC) measures must be placed prior to, or as the first step in grading. The preliminary limits of disturbance must be the minimum necessary to allow installation of the ESC measures and should include all areas necessary for installing the initial ESC measures, including silt fence, sediment traps, diversion dikes, stockpiles, borrow areas, staging areas, etc. Disturbance outside of the preliminary limits of land disturbance may not occur until the Department of Public Works has approved the ESC measure installation. If additional ESC devices are found necessary during construction, they must be installed as directed by the Department of Public Works.
4. Unless otherwise approved by the Department of Public Works, all runoff must drain to a sediment basin or trap during all phases of construction.

5. A construction entrance must be constructed and properly maintained in accordance with Std. & Spec. 3.05 - Construction Entrance, in the latest version of the Virginia Erosion and Sediment Control Handbook. If mud tracking becomes a problem, the Department of Public Works will require additional measures (i.e. wash rack).
6. If dust becomes a problem during construction, a water truck will be required on-site at all times, and dust must be controlled in accordance with Std. & Spec. 3.39 - Dust Control, in the latest version of the Virginia Erosion and Sediment Control Handbook.
7. Dewatering of footings, excavated trenches, sediment basins/traps, etc. must be done in accordance with Std. & Spec. 3.26 - Dewatering Structure, in the latest version of the Virginia Erosion and Sediment Control Handbook. The Department of Public Works must approve the method prior to beginning dewatering.
8. All activities on the site must comply with Chapter 241 of the City of Colonial Heights Code and the current Virginia Erosion and Sediment Control Handbook.
9. All temporary stockpile locations must be shown on the plan.
10. In subdivision developments, temporary sediment basins/traps must remain in place until all disturbed areas are stabilized. Sediment basins/traps cannot be removed without approval of the Department of Public Works. Once the temporary sediment basin/traps have been removed, the developer, contractor, and/or homeowner are responsible for erosion and sediment control on individual lots until stabilization is achieved.
11. In the event a contractor dumps, discharges or spills any oil or chemical that reaches or has the potential to reach a waterway, the contractor shall immediately notify all appropriate jurisdictional agencies (State, Federal, and Department of Public Works (520-9334)) and shall take immediate actions for containment and removal of the oil or chemical.

UTILITY NOTES:

1. All storm and sanitary sewer lines not in streets are to be mulched and seeded within 7 days after backfill. No more than 500 feet of trench is to be open at one time.
2. All construction discharge water shall be adequately filtered to remove silt prior to discharge into waterways and wetlands.

STREAM CROSSINGS / DIVERSIONS:

1. No motorized equipment will at any time be within a waterway unless supported by floatation equipment or a temporary construction pad composed of clean non-erodible material (rocks, rip-rap, mats).
2. All stream crossings and stream diversions require approval from the Department of Public Works prior to any in-stream work.

LIME / FERTILIZER:

1. The area to be seeded shall first be treated with commercial 10-10-10 fertilizer at the rate of 30 lbs. per 1000 sq.ft. and treated with agricultural lime at the rate of 100 lbs. per 1000 sq.ft., which shall be uniformly worked into the surface to a minimum depth of 1 inch.

SEEDING NOTES:

1. All stabilization/seeding will be accomplished in accordance with the Virginia Erosion and Sedimentation Control Handbook.
2. Any disturbed area not paved, sodded, or built upon, will have a vegetative cover prior to final inspection, and in the opinion of the Department of Public Works will be mature enough to control soil erosion satisfactorily and survive severe weather conditions.
3. Stream diversion areas, waterways, banks and related areas will be seeded and mulched immediately after work in watercourse is completed.
4. Winterization - any disturbed area not paved, sodded or built upon by October 15 is to be seeded and mulched on that date unless waived by the Department of Public Works.
5. All wetlands temporarily disturbed during construction will be restored to their original elevation, by removing excess material, grading and seeding with a wetland seed mix. In no case shall wetland areas be reseeded with any species of fescue.
6. Temporary seeding will be applied within 7 days to denuded areas which may not be at final grade but will remain dormant (undisturbed) for longer than 30 days. For temporary seeding use 50% of the recommended rates of fertilizer, lime and full amount of seed and mulch required for regular seeding.
7. Electric power, telephone, and gas supply trenches are to be compacted, seeded and mulched within 7 days after backfill.
8. Before sowing seed, rake surfaces to eliminate depressions and ridges. Once seed is sown, lightly rake in order to cover the seed no deeper than 1/4", and water. Seeded surfaces shall be covered with straw or hay to prevent erosion and protect seeding. Contractor is responsible for protecting seeded surfaces until a good stand of grass is established.
9. The "Hydro-Seeding" method may be used, provided the seed rate per square foot is the same as specified. The mulch rate shall be such as to provide proper seed protection and prevent erosion. If the mulch rate is not sufficient, as evidenced by slopes after spraying, then the Department of Public Works may require the Contractor to increase the amount of mulch in the mix. No extra will be allowed.

TEMPORARY SEEDING:

TABLE 3.31-B (Revised June 2003) TEMPORARY SEEDING SPECIFICATIONS QUICK REFERENCE FOR ALL REGIONS		
APPLICATION DATES	SEED SPECIES	APPLICATION RATES
Sept. 1 - Feb. 15	50/50 Mix of Annual Ryegrass (lolium multi-florum) & Cereal (Winter) Rye (Secale cereale)	50 -100 (lbs/acre)
Feb. 16 - Apr. 30	Annual Ryegrass (lolium multi-florum)	60 - 100 (lbs/acre)
May 1 - Aug. 31	German Millet	50 (lbs/acre)
FERTILIZER & LIME		
● Apply 10-10-10 fertilizer at a rate of 450 lbs. / acre (or 10 lbs. / 1,000 sq. ft.) ● Apply Pulverized Agricultural Limestone at a rate of 2 tons/acre (or 90 lbs. / 1,000 sq. ft.)		
NOTE: 1 - A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site. 2 - Incorporate the lime and fertilizer into the top 4 - 6 inches of the soil by disking or by other means. 3 - When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin #4, 2003 Nutrient Management for Development Sites at <a href="http://www.dcr.state.va.us/saw/e&amp;s.html#pubs">http://www.dcr.state.va.us/saw/e&amp;s.html#pubs</a>		

RESOURCE PROTECTION AREAS, STREAM PROTECTION AREAS, WETLANDS, AND WATERS OF THE U.S.

1. Prior to beginning any land disturbing activity, all Resource Protection Areas (RPAs), Stream Protection Areas (SPAs), wetlands, and Waters of the U.S. (WOUS) not permitted for impact shall be delineated for protection with flagging and optic orange safety fence Spec 3.01. This includes but is not limited to clearing limits associated with roadways, utilities, and buildings.
2. Additional restoration or replanting may be required for RPAs, SPAs, wetlands, and WOUS disturbed during construction.

RPA AND WETLAND RESTORATION FOR PERMANENT EASEMENTS:

- All permanent easements disturbed within the RPA or wetlands shall be seeded with a grass mixture of 20% Buckwheat, 20% Brown Top Millet, 20% German Top Millet, 20% Annual Rye Grass, 10% Poa Trivialis, 5% Switch Grass, 5% Red Top Grass at 50 lbs/acre.

RPA AND WETLAND RESTORATION PLAN FOR SANITARY SEWER LATERALS:

- All sanitary sewer lateral disturbance within the RPA or wetlands, but outside the permanent easement, shall be restored with similar vegetation. If shrubs and trees were removed, they shall be replaced at equal density with the following options:

- Medium to large trees - Persimmon, Sweetgum or Southern Red Oak.

- Small trees - Flowering Dogwood, Silky Dogwood or Sweet Magnolia.

- Shrubs - Red Chockcherry, Greystem Dogwood or Witch Hazel.

- Low shrubs or groundcovers - Bearberry or Virginia Bluebells.

- If a grass area was disturbed, it shall be replaced with a seed mixture of 26% Big Bluestem, 40% Indian Woodrats, 6% Switch Grass, 14% Little Bluestem and 14% Indain Grass at 40 lbs/acre.

CERTIFIED RESPONSIBLE LAND DISTURBER (CRLD) POLICY

As a prerequisite to engaging in the land-disturbing activities shown on this plan, the individual responsible for carrying out the plan and holding a certificate of competence shall be identified (the CRLD).

The CRLD will:

1. Attend the Pre-Construction meeting and sign the approved plans;

2. Inspect the ESC measures at least once every two weeks, or within 48 hours of any runoff producing storm event;

3. For projects with site area of 1 acre or greater, submit inspection reports using standard DCR forms;

4. Coordinate the implementation and maintenance of all erosion and sediment control measures in accordance with the approved plan.

BMP INSPECTIONS / CERTIFICATIONS

1. Inspections of proposed BMPs must be conducted at two phases of construction - "rough grading" and "final conformance". Department of Public Works staff, the Developer or his/her representative, and the Developer's Engineer should be present at the inspections.
2. The Developer or his/her representative is responsible for notifying the Department of Public Works at the appropriate times during construction when the inspections should occur. Failure to request the inspections may result in delay of final acceptance of the BMP. Three inches of topsoil is required for areas of the BMP that will be stabilized with vegetation.
3. The Developer's Engineer/Surveyor will provide a letter of conformance once the final conformance inspection has been performed and all issues resolved.
4. Prior to release of the Erosion and Sediment Control bond, the Developer's Engineer/Surveyor will provide a BMP Certification using standard City forms.

PERMANENT SEEDING:

TABLE 3.32-D (Revised June 2003) PERMANENT SEEDING SPECIFICATIONS FOR PIEDMONT AREA		
LAND USE	SEED SPECIES	APPLICATION PER ACRE
Minimum Care Lawn (Commercial or Residential)	Tall Fescue <sup>1</sup>	95-100%
	Perennial Ryegrass	0-5%
	Kentucky Bluegrass <sup>1</sup>	0-5%
		TOTAL: 175-200 lbs.
High-Maintenance Lawn	Tall Fescue <sup>1</sup>	TOTAL: 200-250 lbs.
General Slope (3:1 or less)	Tall Fescue <sup>1</sup>	128 lbs.
	Red Top Grass or Creeping Red Fescue	2 lbs.
	Seasonal Nurse Crop <sup>2</sup>	20 lbs.
		TOTAL: 150 lbs.
Low-Maintenance Slope (Steeper than 3:1)	Tall Fescue <sup>1</sup>	108 lbs.
	Red Top Grass or Creeping Red Fescue	2 lbs.
	Seasonal Nurse Crop <sup>2</sup>	20 lbs.
		TOTAL: 150 lbs.
1 - When selecting varieties of turfgrass, use the Virginia Crop Improvement Association (VCIA) recommended turfgrass variety list. Quality seed will bear a label indicating that they are approved by VCIA. A current turfgrass variety list is available at the local County Extension office or through VCIA at 804-746-4884 or at <a href="http://sudan.ces.vt.edu/html/Turf/turfpublications/publications2.html">http://sudan.ces.vt.edu/html/Turf/turfpublications/publications2.html</a>		
2 - Use seasonal nurse crop in accordance with seeding dates as stated below: February 16 <sup>th</sup> - April ..... Annual Rye May 1 <sup>st</sup> - August 15 <sup>th</sup> ..... Foxtail Millet August 16 <sup>th</sup> - October ..... Annual Rye November - February 15 <sup>th</sup> ..... Winter Rye		
3 - Substitute Sericea lespedeza for Crownvetch east of Farmville, VA (May through September use hulled seed, all other periods, use unhulled Sericea). If Flatpae is used, increase rate to 30 lbs./acre. If Weeping Lovegrass is used, include in any slope or low maintenance mixture during warmer seeding periods, increase to 30-40		
FERTILIZER & LIME		
● Apply 10-20-10 fertilizer at a rate of 500 lbs. / acre (or 12 lbs. / 1,000 sq. ft.) ● Apply Pulverized Agricultural Limestone at a rate of 2 tons/acre (or 90 lbs. / 1,000 sq. ft.)		
NOTE: - A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site. - Incorporate the lime and fertilizer into the top 4 - 6 inches of the soil by disking or by other means. - When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin #4, 2003 Nutrient Management for Development Sites at <a href="http://www.dcr.state.va.us/saw/e&amp;s.html#pubs">http://www.dcr.state.va.us/saw/e&amp;s.html#pubs</a>		

ENVIRONMENTAL SITE ASSESSMENT INFORMATION:

Resource Protection Areas (RPA):

1. Is there a perennial stream located on this parcel? ☐ Yes ☒ No
2. Are there any tidal wetlands present on the parcel? ☐ Yes ☒ No
3. Are there any non-tidal wetlands connected by surface flow and contiguous to tidal wetlands or tributary streams? ☐ Yes ☒ No
4. Are there any tidal shores on the parcel? ☐ Yes ☒ No
5. Does the site lie within 100' of any of the above site characteristics designated as Resource Protection Areas (RPA)? ☐ Yes ☒ No

If the answer to any of the above questions is Yes, the parcel contains a Resource Protection Area (RPA).

Resource Management Areas:

6. Are there any base flood hazard areas (100-year floodplain) on the parcel? ☐ Yes ☒ No
7. Are highly erodible soils, including steep slopes, present on the parcel and contiguous to any of the above RPA features? ☐ Yes ☒ No
8. Does the parcel contain any highly permeable soils contiguous to an RPA? ☐ Yes ☒ No
9. Does any portion of the parcel lie within 100' of a (RPA)? ☐ Yes ☒ No
10. Does the entire site (outside of the RPA) lie within a Resource Management Area? ☐ Yes ☒ No

Other Environmental site information:

11. Are there any wetlands/waters of the United States on the parcel? ☐ Yes ☒ No
12. Is development or land disturbance proposed in wetlands/waters of the United States? ☐ Yes ☒ No

Parcels containing RPAs/RMAs must satisfy all requirements of the City of Colonial Heights Code applicable to development within Chesapeake Bay Preservation Areas. Land disturbance in wetlands and/or waters of the United States requires either evidence of U.S. Army Corps of Engineers/Department of Environmental Quality (DEQ) permits or a certification from a Principal in the engineering firm that proposed wetland impacts are authorized by law.

I hereby certify that the above information is based on a field visit performed on April 2015 and that I have reviewed all maps and other documentation deemed necessary to certify the accuracy of this information.

Signature: Spencer M Francis Date: 5/13/2015

Name (Please Print): Spencer M Francis

Virginia License or Certificate Number: 043805

ACKNOWLEDGMENTS:

I hereby acknowledge that prior to any land-disturbing activity, all buffer areas and wetlands as defined in the City of Colonial Heights Code shall be conspicuously flagged or otherwise identified and not disturbed unless authorized by law, and the applicant shall notify the Department of Public Works upon completion of flagging. (Contact the Department of Public Works at 520-9334 to arrange a pre-construction meeting to verify limits of flagging).

I hereby certify that no more land is being disturbed than is necessary to provide for the desired development use.

I hereby certify that all erosion and sediment control measures shall be maintained, and the owner and/or agent and CRLD will inspect the erosion and sediment control measures at least once every two week period, and within 48 hours following rainstorm events during construction to ensure continued compliance with the approved plan. Records of self-inspection shall be maintained on the site and available for review by the Department of Public Works.

I hereby acknowledge that the U.S. Army Corps of Engineers / DEQ may have additional jurisdiction over wetlands not regulated by the City of Colonial Heights.

I hereby acknowledge that a Virginia Stormwater Management (VSM) permit application and fee form have been submitted to the Department of Public Works, if required.

Signature (Owner/Developer): \_\_\_\_\_ Date: \_\_\_\_\_

Name (Please Print): \_\_\_\_\_



**Bowman**  
CONSULTING GROUP, LLC

www.bowmanconsulting.com

Bowman Consulting Group, Ltd.  
3951 Westerline Parkway  
Suite 150  
Richmond, Virginia 23233  
Phone: (804) 616-3240  
Fax: (804) 270-2008

SUBMITTAL DATE  
05/13/2015

DATE REVISION  
05/01/2015 PROGRESS SET  
05/06/2015 BID SET  
05/13/2015 FINAL BID SET

CITY OF COLONIAL HEIGHTS  
DEPARTMENT OF PUBLIC WORKS  
ENGINEERING & DEVELOPMENT DIVISION

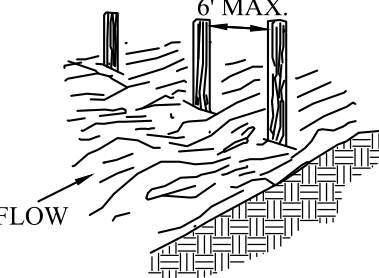
DRAWN  
DF, JD, JF, JW, MT  
DESIGNED  
DF, JW, MT  
CHECKED  
SF, JJ  
SCALE  
NONE

CITY OF COLONIAL HEIGHTS  
DEPARTMENT OF PUBLIC WORKS  
ENGINEERING & DEVELOPMENT DIVISION

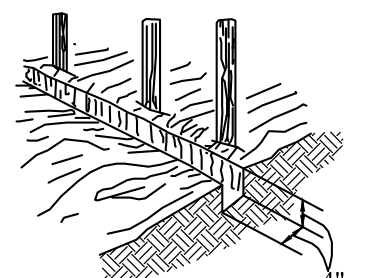
BRUCE AVENUE DRAINAGE IMPROVEMENTS  
STANDARD EROSION CONTROL NOTES

SHEET NO.  
17 OF 31

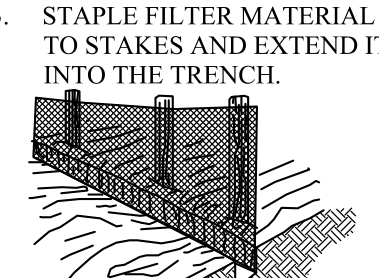
1. SET THE STAKES.



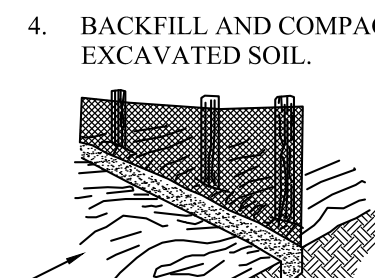
2. EXCAVATE A 4"x4" TRENCH UPSLOPE ALONG THE LINE OF STAKES.



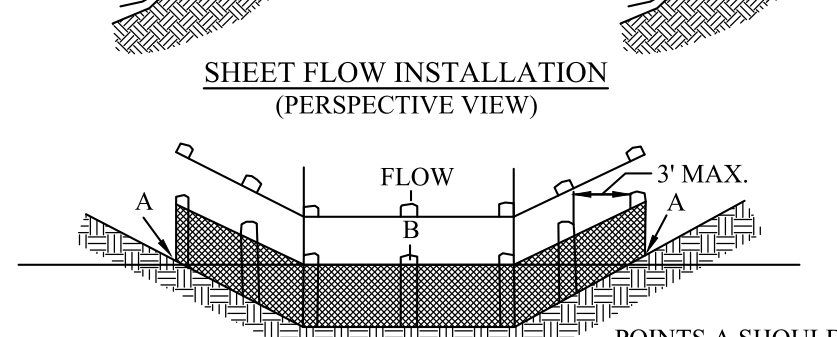
3. STAPLE FILTER MATERIAL TO STAKES AND EXTEND IT INTO THE TRENCH.




4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



SHEET FLOW INSTALLATION  
(PERSPECTIVE VIEW)



DRAINAGEWAY INSTALLATION  
(FRONT ELEVATION)



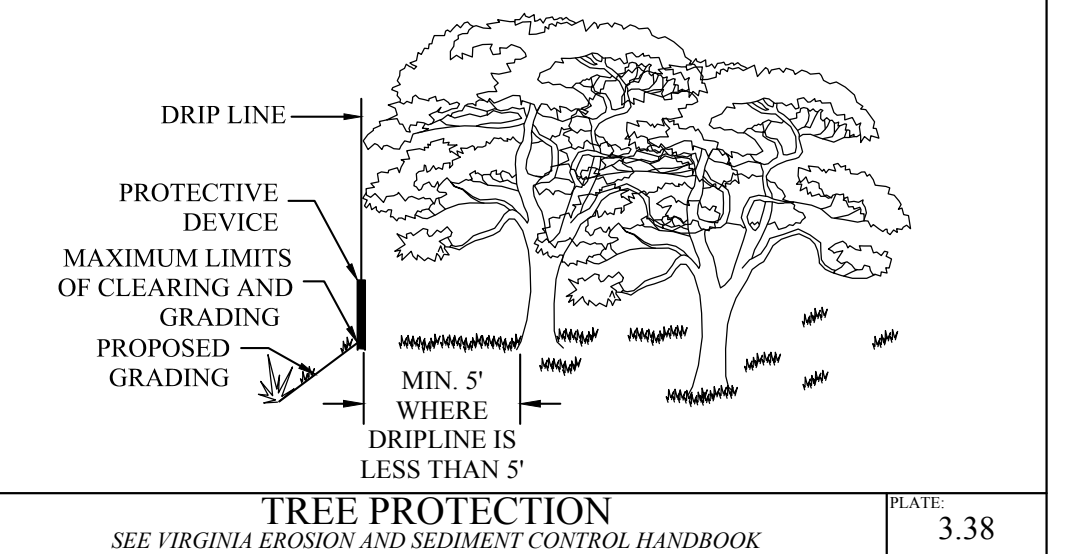
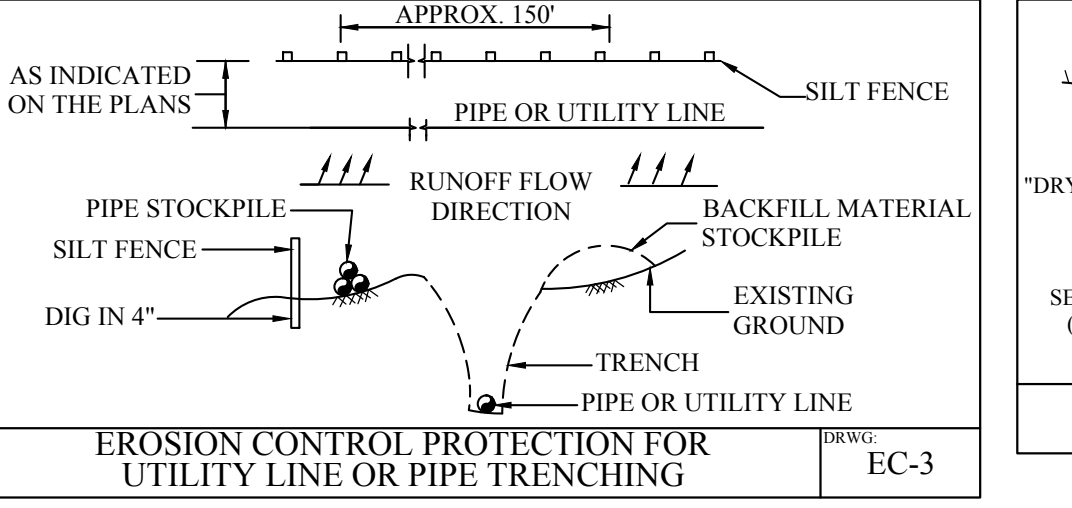
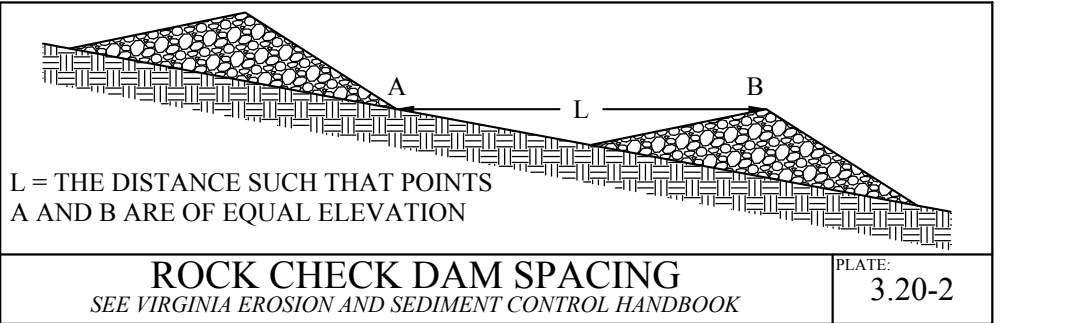
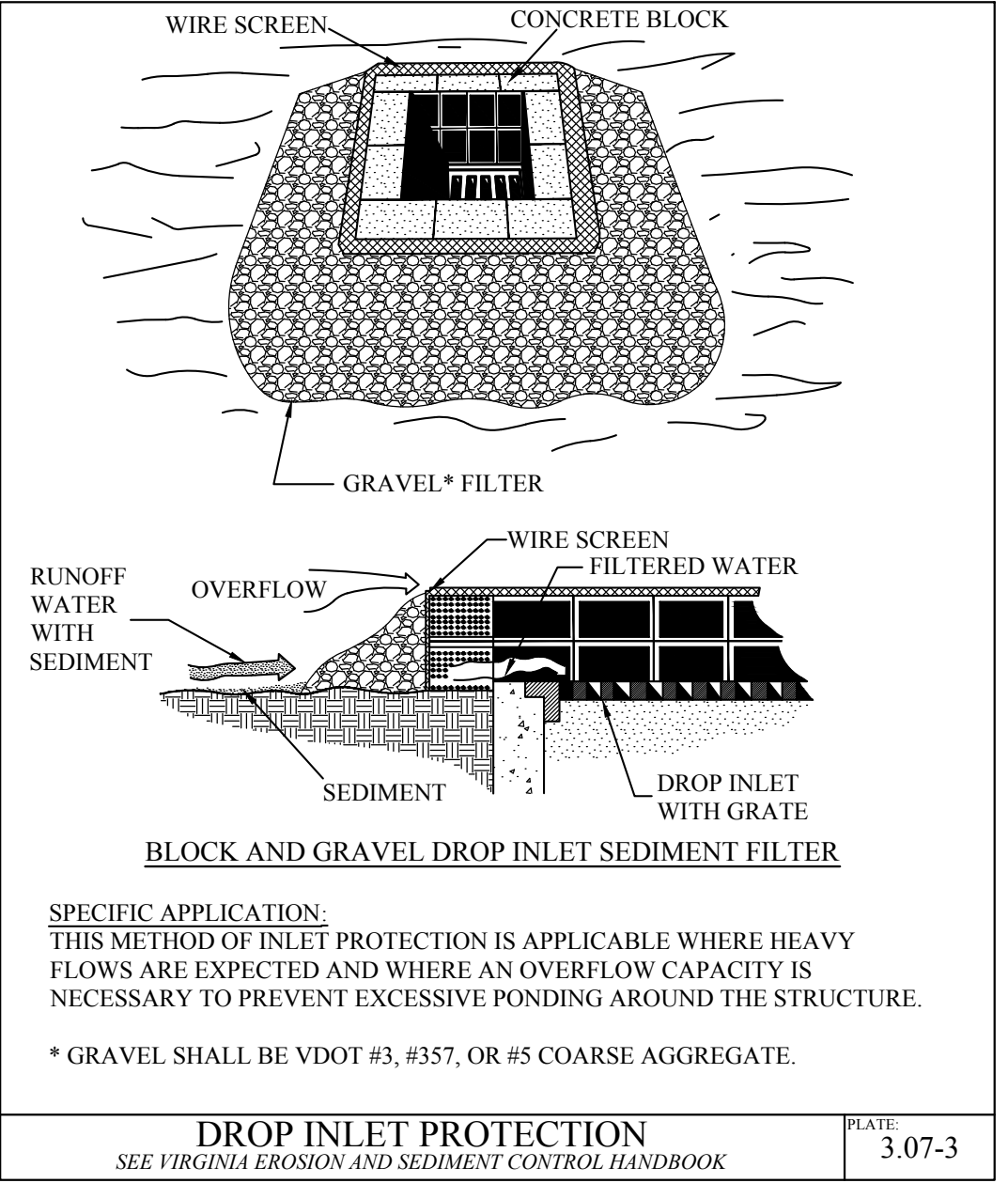
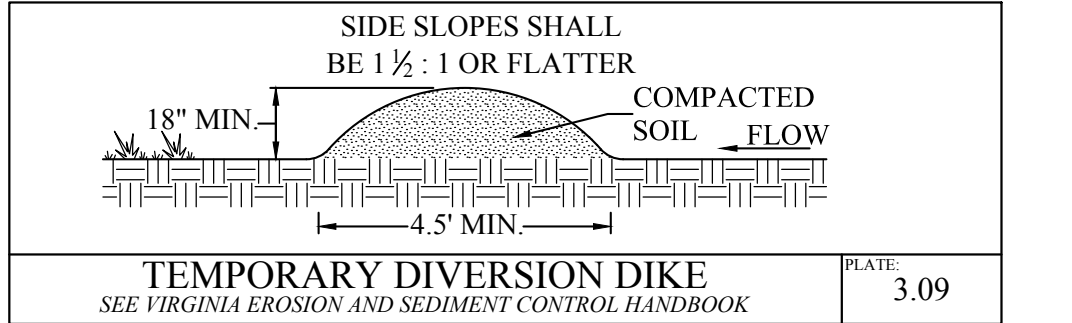
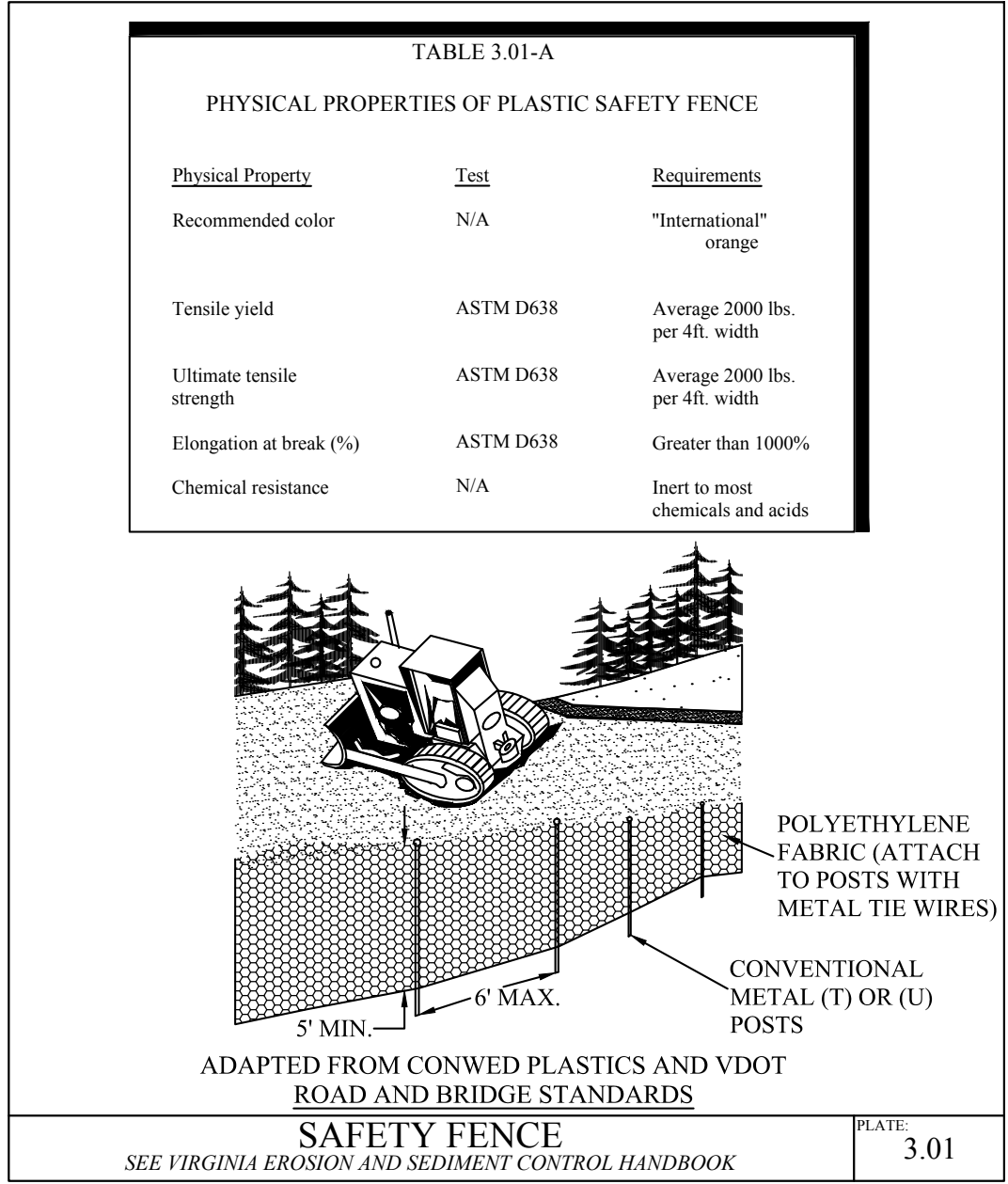
POINTS A SHOULD BE HIGHER THAN POINT B

SILT FENCE (WITHOUT WIRE SUPPORT)

VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK

PLATE 3.05

P:\004956 - Colonial Heights On-Call\004956-01-009 (ENG) - Bruce Battery\Engineering\Engineering Plans\4956-CP-009-ES1.dwg, Plot Created May 13, 2015 - 11:16pm by mtomaszewski



**OUTFALL ADEQUACY**

In accordance with Minimum Standard 19 of the Erosion and Sediment Control Regulations, adequacy of off-site receiving channels or pipes must be verified by addressing one of the following Adequacy Situations:

A. The drainage area from the project at the discharge point is less than or equal to one percent of the total drainage area at the discharge point and the 10-year storm is contained within the channel banks (Project Drainage Area and Total Drainage Area are required),

**OR**

B. Natural channels must be analyzed to demonstrate that the 2-year storm will not cause erosion of the channel bed or banks ( $Q_{Capacity}$ ,  $Q_2$ ,  $V_{Allowable}$  and  $V_2$  are required),

**OR**

C. Man-made channels must be analyzed to demonstrate that (1) the 10-year storm will not overtop the channel banks and (2) the 2-year storm will not cause erosion of the channel bed or banks ( $Q_{Capacity}$ ,  $Q_2$ ,  $Q_{10}$ ,  $V_{Allowable}$  and  $V_2$  are required),

**OR**

D. Pipes and storm sewer systems must be analyzed to demonstrate that the ten-year storm will be contained within the system ( $Q_{Capacity}$ ,  $Q_{10}$ , and hydraulic grade line calculations are required),

**OR**

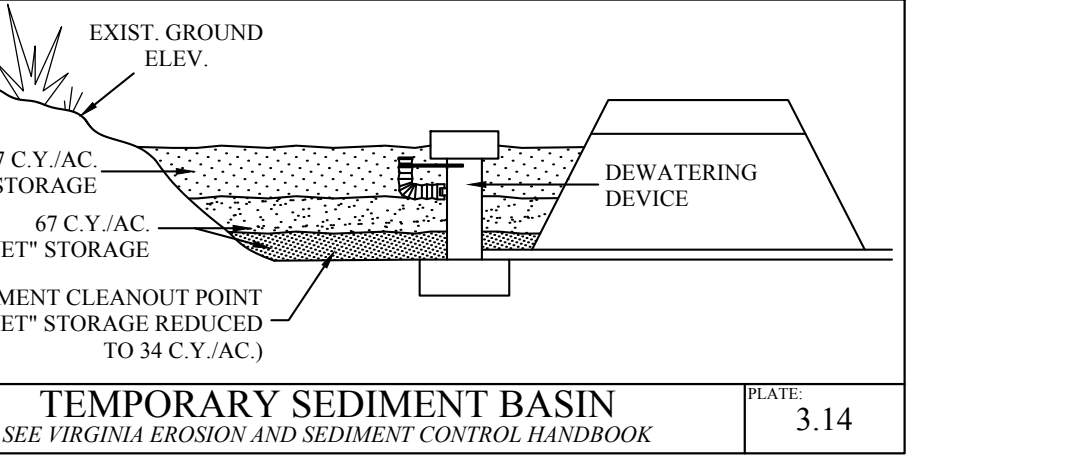
E. Runoff is discharged through an energy dissipator at the limits of the 100-year floodplain, RPA buffer or SPA buffer.

Discharge Point	Adequacy Situation	Project Drainage Area	Total Drainage Area	$Q_2$	$V_2$	$Q_{10}$	$V_{Allowable}$	$Q_{Capacity}$	Cross Section, Profile and Calculations Shown on Sheet(s)
***	***	***	***	***	***	***	***	***	***
***	***	***	***	***	***	***	***	***	***
***	***	***	***	***	***	***	***	***	***
***	***	***	***	***	***	***	***	***	***
***	***	***	***	***	***	***	***	***	***

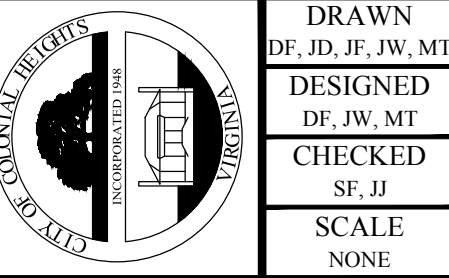
Discharge Point = unique identifier for the discharge point  
 Adequacy Situation = either A, B, C, D, or E as described above  
 Project Drainage Area = drainage area of the project that drains to the discharge point (ac.)  
 Total Drainage Area = total drainage area to the discharge point (in ac.)  
 $Q_{Capacity}$  = carrying capacity of the channel or pipe in cfs

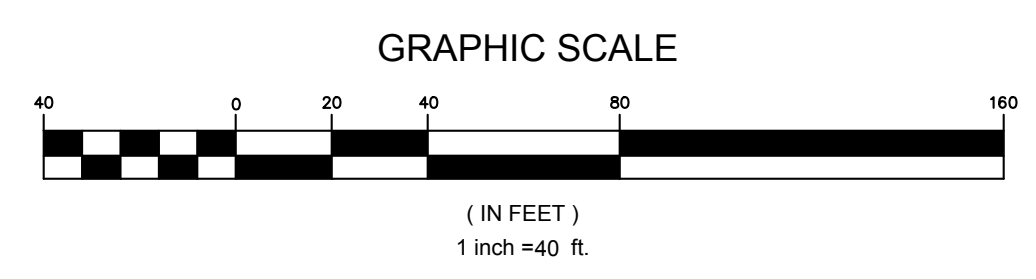
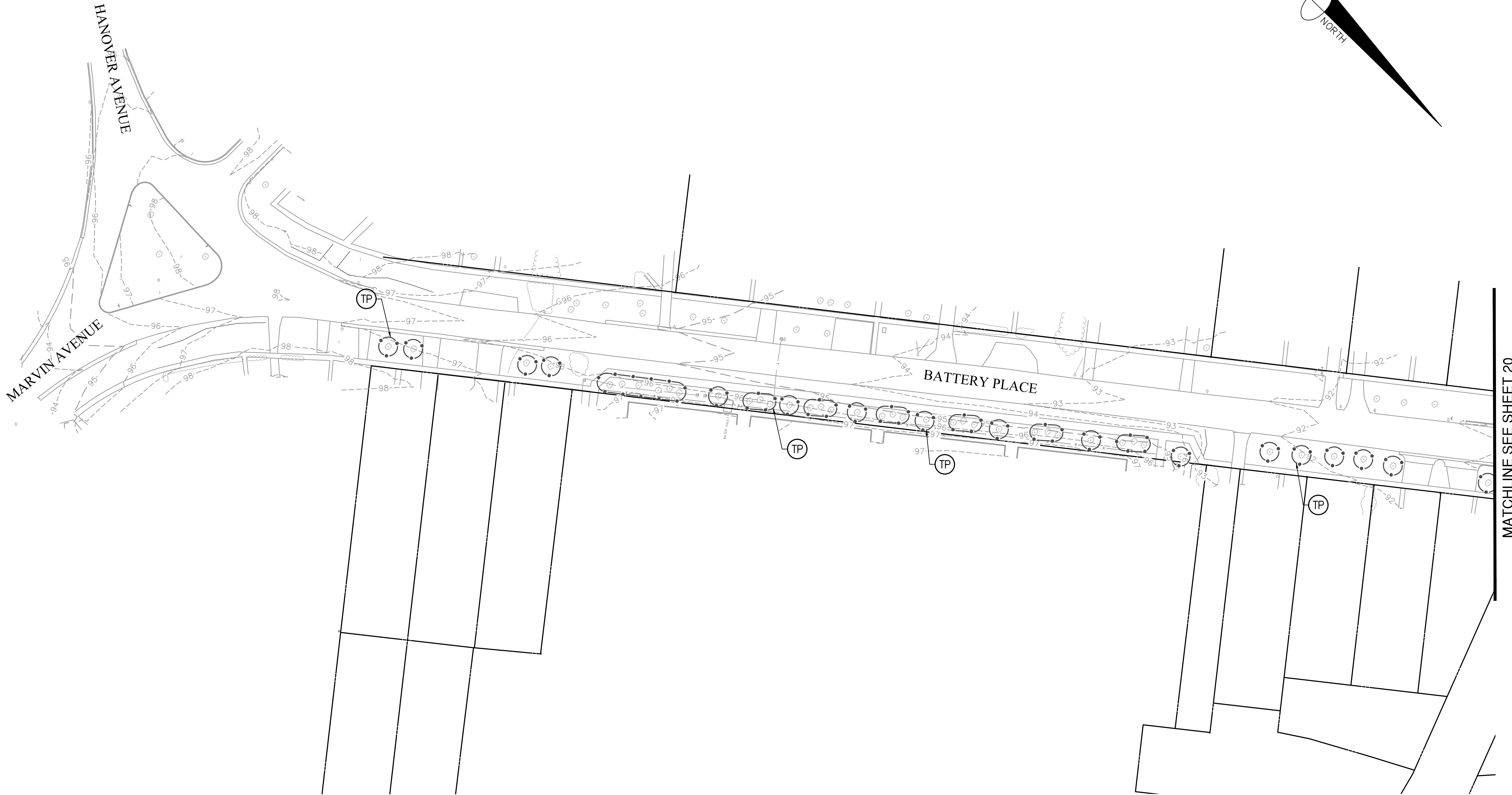
$Q_2$  = peak discharge at the discharge point for the 2-year storms (cfs)  
 $Q_{10}$  = peak discharge at the discharge point for the 10-year storms (cfs)  
 $V_{Allowable}$  = max. velocity the channel lining can withstand without eroding (fps)  
 $V_2$  = velocity at the discharge point for the 2-year storm (fps)

Generally, scaled channel cross-sections must be provided every fifty (50) feet and at the most constricted locations of all outfall channels for a minimum of 150 feet of profile.

[illegible][illegible]

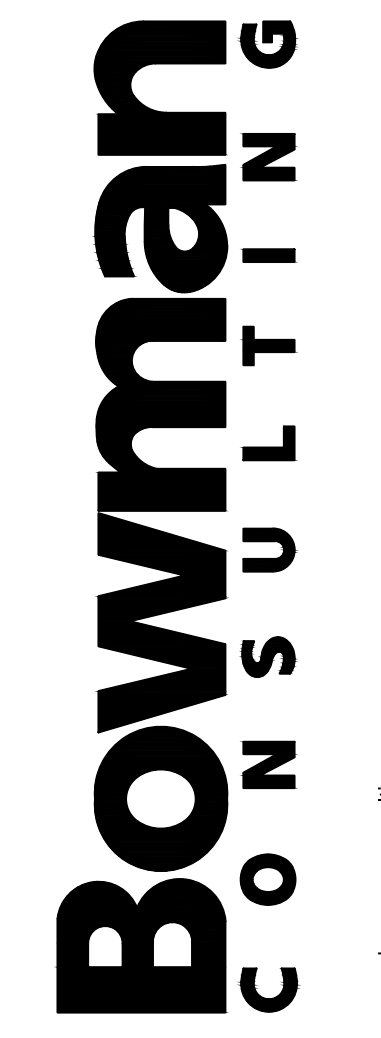
SUBMITTAL DATE	
05/13/2015	
DATE	REVISION
5/01/2015	PROGRESS SET
5/06/2015	BID SET
5/13/2015	FINAL BID SET





EROSION AND SEDIMENT CONTROL LEGEND

NO.	TITLE	KEY	SYMBOL
3.07	STORM DRAIN INLET PROTECTION	IP	
3.08	CULVERT INLET PROTECTION	CIP	
3.38	TREE PROTECTION	TP	

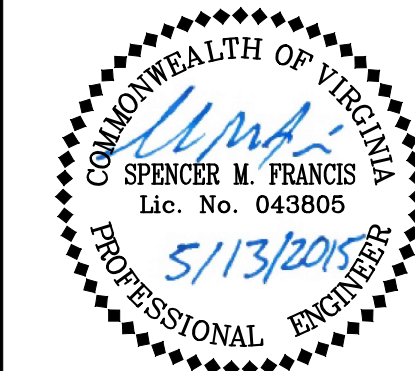


Bowman Consulting Group, Ltd.  
3951 Westerre Parkway  
Suite 150  
Richmond, Virginia 23233  
Phone: (804) 616-3240  
Fax: (804) 270-2008

DATE	REVISION
05/01/2015	PROGRESS SET
05/06/2015	BID SET
05/13/2015	FINAL BID SET

	DRAWN
	DESIGNED
	CHECKED
	SCALE

CITY OF COLONIAL HEIGHTS  
DEPARTMENT OF PUBLIC WORKS  
ENGINEERING & DEVELOPMENT DIVISION  
BRUCE AVENUE DRAINAGE IMPROVEMENTS  
PHASE 1 EROSION CONTROL PLAN



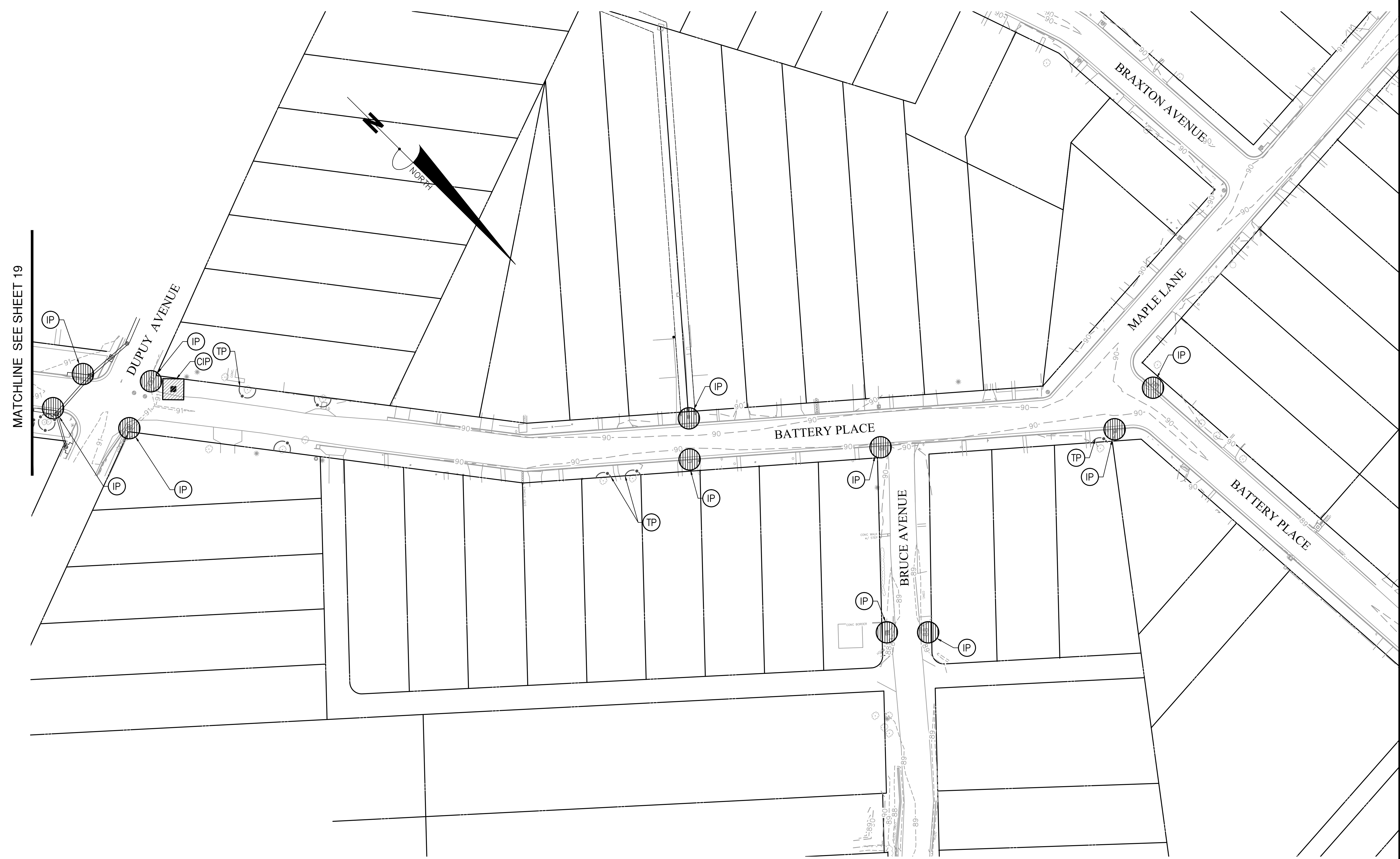
**Bowman**  
CONSULTING

Bowman Consulting Group, Ltd.  
3951 Westerre Parkway  
Suite 150  
Richmond, Virginia 23233  
Phone: (804) 616-3240  
Fax: (804) 270-2008

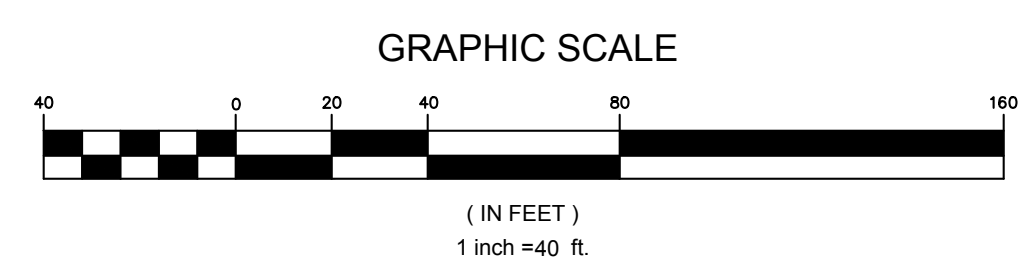
SUBMITTAL DATE	
05/13/2015	
DATE	REVISION
05/01/2015	PROGRESS SET
05/06/2015	BID SET
05/13/2015	FINAL BID SET

	DRAWN
	DF, JD, JF, JW, MT
	DESIGNED
	DF, JW, MT
	CHECKED
	SF, JJ
SCALE	
1" = 40'	

**CITY OF COLONIAL HEIGHTS**  
DEPARTMENT OF PUBLIC WORKS  
ENGINEERING & DEVELOPMENT DIVISION  
**BRUCE AVENUE DRAINAGE IMPROVEMENTS**  
PHASE 1 EROSION CONTROL PLAN



MATCHLINE SEE SHEET 19



EROSION AND SEDIMENT CONTROL LEGEND			
NO.	TITLE	KEY	SYMBOL
3.07	STORM DRAIN INLET PROTECTION	IP	
3.38	TREE PROTECTION	TP	